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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,141	12/01/2003	Kyung-Hyun Park	3364P155	3787

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EXAMINER	
VAN ROY, TOD THOMAS	
ART UNIT	**PAPER NUMBER**
2828	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/726,141	PARK ET AL.	
	Examiner	Art Unit	
	Tod T. Van Roy	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/18/2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,9 and 11-15* is/are rejected.

7)☒ Claim(s) *7-8,10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The examiner acknowledges the addition of claim 15.

Response to Arguments

Applicant's arguments filed 12/18/2006 have been fully considered but they are not persuasive.

With respect to claim 1, the applicant has argued that Hiroki teaches a multi-sectioned laser diode which does not generate pulsed light, but rather, generates TE/TM mode light which is then transmitted through an external optical polarizer creating the pulsation.

The examiner agrees with the applicant's summary of the Hiroki reference. The examiner does not, however, agree that claim 1 clearly states the pulsation is generated by the laser alone. The last few lines of claim 1 read, "...where high-frequency optical pulsation can be generated and the pulsation frequency can be varied...". The examiner is of the belief that this does not clearly define the diode laser must produce the pulsed light, but that pulsed light must be able to be produced from the output of the diode. Therefor, as Hiroki teaches an external polarizer causing the output from the diode to be pulsed, the reference is believed to correctly read on the claim.

The examiner notes that the new limitation in claim 15, "...wherein the multi-section semiconductor diode laser outputs high-frequency optical pulsation..", more clearly defines the pulsed output to come from the diode itself.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-6, and 11-12, are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroki (US 5841799) in view of Huang (US 6018541).

With respect to claims 1 and 5, Hiroki teaches a self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency (col.9 lines 20-42), comprising: a DFB laser section (fig.7 125a) that includes a grating (fig.7 #121) and an active structure (fig.7 #132, left side) for emitting laser light in a longitudinally single mode (col.8-9 lines 59-12), wherein the intensity of oscillating laser light is controlled by means of the current injected to the DFB laser section (col.9 lines 9-17, via control of gain); and an external cavity including a phase control section (fig.7 124) and an amplifier section (fig.7 125b) for controlling

the phase and strength of he laser light fed back to the DFB laser section after round-trip through the phase control section and the amplifier section by means of the currents injected into the phase control section and the amplifier section (col.9 lines 9-17, col.8 lines 39-46), the phase control section having a guiding layer as a passive waveguide (fig.7 #131) that controls a phase variation of feedback laser light (col.9 lines 9-17), the amplifier section having an active structure (fig.7 #132) that controls the strength of the feedback laser light, the DFB section and the external cavity being monolithically integrated on a single substrate, current being independently injected into each of the sections (col.8 lines 39-46), wherein high-frequency optical pulsation can be generated and the pulsation frequency can be varied in a wide range according to the phase and strength of the feedback laser light (col.9 lines 20-42, fig.6 – obvious frequency can be varied as seen by the time scale). Hiroki does not teach the DFB laser section to be complex coupled. Huang teaches a DFB laser waveguide wherein the grating is gain-complex coupled (col.3 lines 25-35, inherently varying the effective refractive index and gain). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Hiroki with the grating structure of Huang in order to align the peaks of the grating with the peaks of the standing wave in the device and in effect amplify the optical energy of the standing wave (Huang, col.3 lines 45-46), while maintaining the feedback functionality of the grating.

With respect to claim 2, Hiroki further teaches the laser diode can be a buried heterostructure (fig.1).

With respect to claim 3, Hiroki further teaches the laser diode has a ridge structure (fig.2).

With respect to claim 4, Huang further teaches the use of a loss coupled grating constructed in a manner which a diffraction grating is formed in an additional absorptive layer (col.3 lines 25-32), which longitudinally periodically varies both effective refractive index and loss (inherent function of the loss grating). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB structure of Hiroki and Huang with the loss coupled grating of Huang in order to reduce levels of light reflected back into the device structure (Huang, col.3 lines 55-60).

With respect to claim 6, Hiroki further teaches the incorporation of a first light guide layer, an active layer, and a second light guiding layer in the DFB and amplifier sections (fig.7 # 131, 132, 113).

With respect to claim 11, Hiroki further teaches the DFB laser section, the phase control section and the amplifier section are constructed through evanescent coupling in which the sections have a common guide layer (sections coupled through common guide layer fig.7 #131).

With respect to claim 12, Hiroki further teaches the phase control section to be located between the DFB and the amplifier sections (fig.7).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroki and Huang in view of Oka et al. (US 5177758).

With respect to claim 9, Hiroki teaches the guiding layer of the phase control section to be arranged through butt-coupling, but does not teach its central axis to accord with those of the active structures. Oka teaches a grated laser structure incorporated monolithically with a phase control and amplifier section, wherein the central axis of the guiding layer of the phase control section aligns with the active sections (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB structure of Hiroki and Huang with the guiding layer alignment of Oka in order to maximize the amount of light coupled from one region to the next through the device.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroki and Huang in view of Kuindersma et al. (US 4995048).

With respect to claim 13, Hiroki and Huang teach the DFB laser device as outlined in the rejection to claim 1, but do not teach the amplifier section to be located between the DFB and the phase control sections. Kuindersma teaches a grated laser structure incorporated monolithically with a phase control and amplifier section, wherein the amplifier section is located between the grating and phase sections (col.2 lines 50-55). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Hiroki and Huang with the device organization of Kuindersma as a matter of engineering design choice, and further could be considered a rearrangement of parts, which has been held to be of routine skill in the art (In re Japikse, 86 USPQ 70).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroki and Huang in view of Nitta et al. (US 6031860).

With respect to claim 14, Hiroki and Huang teach the DFB laser device as outlined in the rejection to claim 1, including the use of AR coatings, but do not teach the use of an HR coating. Nitta teaches a three-section DFB, phase, and amplifier device wherein AR and HR coatings are used (col.9 lines 5-7). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Hiroki and Huang with the coatings of Nitta in order to designate one side of the device for outputting radiation for use in a communication system, reducing loss from the opposite facet.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroki in view of Huang and further in view of Sakata et al. (US 5220573).

With respect to claim 15, Hiroki and Huang teach the multi-section laser diode outlined in the rejection to claim 1 above, but do not teach the multi-sectioned diode to output optical pulses. Sakata teaches a multi-section laser diode (fig.20), including production of TE light (col.15 lines 45-46)) and an integrated polarizer which blocks TM light (col.15-16 lines 66-5). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the external polarizer of Hiroki with the integrated polarizer of Sakata in order to alleviate problems associate with alignment and coupling of separate optical components.

Allowable Subject Matter

Claims 7-8 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 7-8 are believed to be allowable based on the fact that, a complex coupled DFB laser section monolithically integrated with a phase control and amplifier sections, including in the DFB section a first light guide layer, active region, and second light guide layer, wherein the guide layers are of InGaAsP with a bandgap of 1.3um and a thickness of 70nm, and the active region is of InGaAsP with a bandgap of 1.55um, was not found to be taught in the prior art.

Claim 10 is believed to be allowable based on the fact that, a complex coupled DFB laser section monolithically integrated with a phase control and amplifier sections, including in the phase control section a guiding layer which is arranged through butt-coupling such that its central axis accords with those of the active structures, wherein the guiding layer is of InGaAsP with a bandgap of 1.3um and a thickness of 400nm.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR

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PRIMARY EXAMINER